MYRIAPODS.—Mr. Chas. H. Bollman has recently published several papers on North American Myriapods. One, entitled "Notes on the North American Lithobidæ," appears in the *Annals of the New York Academy of Sciences.* In it he describes as new *Lithobus minnesotæ, tuber, proridens, pullus, trilobus, cardinalis, howei, politus* (McNiell MS.), and *clavus* (McNiell MS.). This is followed by a synonymical list of the known species of North American Lithobidæ and Scutigeridæ. A second paper—"Notes on North American Julidæ"—appears in the *Annals of the New York Academy* (vol. iv.). The author catalogues ninety-two species of the family known from North America, including the following new species: *Julus oweni, Spirobolus pensacolus, S. hebes, Parajulus ellipticus, P. castaneus, P. obtectus, P. varius,* and *Nanolene* (nov. gen.) *burkei.*

FISHES.—Jordan and Eigenmann, in an account of a collection of fishes from Charleston, S. C. (*Proc. Nat. Mus.*, 1887), enumerate fourteen species, nine of which were not previously known from that locality.

In a paper on the fishes of Kansas, Prof. O. P. Hay describes as new *Notropis æneolus* and *N. germanus*, and suggests that the genus Tirodon Hay was founded on a specimen of *Hybognathus nuchalis* with abnormal dentition.

C. Eigenmann and Jennie E. Hornung contribute to the *Annals of the New York Academy* a revision of the North American species of Chætodontidæ. They recognize fourteen species distributed in the genera Prognathodis, Chætodon, and Pomacanthus.

BIRDS.—The large collection of humming-birds made by Mr. D. G. Elliot and which formed the basis of his recent monograph has passed into possession of the American Museum in New York City. The museum has also acquired his ornithological library of about one thousand volumes.

Dr. Leonard Stejneger is publishing in the *Proceedings of the National Museum* an exhaustive review of the birds of Japan. In the same journal Mr. Robert Ridgway has recently described a new sub-species of plumed partridge (*Callipepla elegans bensoni*) from Sonora. His material consisted of five specimens.

EMBRYOLOGY.[1]

Spermatogenesis in Mammalia.[2]—The interest which attaches to the development of the spermatozoon, from the stand-point of the embryologist, is not less than that which attaches to the

[1] Edited by JOHN A. RYDER, Ph D., Biological Department, University of Pennsylvania, Philadelphia.

[2] Untersuchungen über den Bau des functionirenden Samenkanälchens einiger Säugethiere und Folgerungen für die Spermatogenese dieser Wirbeltheirklasse. Arch. f. Mik. Anat., xxx., 1887, pp. 49–110. Taf. v.–vii. Von Dr. Carl Benda, Berlin.

development of the ovum (ovogenesis), or of the embryo itself (ontogenesis), since spermatogenesis and ovogenesis are processes which involve the maturation of the elements which enter the formation of the fertilized ovum or oösphere. All of these processes are therefore properly comprehended under ontogeny or embryology in its widest sense.

Dr. Benda's carefully-elaborated memoir deals with the development of the spermatozoa in *Sus*, *Mus*, *Lepus*, *Cavia*, *Bos*, *Canis*, and *Felis;* the peculiarities in each case are figured and discussed by the author, but the present writer must content himself by giving a *résumé* of the results and conclusions. The following is a synopsis of Dr. Benda's conclusions, as nearly as possible in his own words:

1. The seminal tubuli of the mammalian testis contain two kinds of histological elements, which are distinct in function,—the *Stammzellen*, or spermospores, with their derivatives (mother-cells, spermatoblasts, etc.), and the "supporting cells" (H. H. Brown), or Fusszellen (Benda).

2. Their functional activities are exhibited in four acts,—1. The multiplication of the *Stammzellen* (spermospores); 2. The production of spermatoblasts from a part of the spermospores; 3. Copulation or union of the "supporting cells,"—*Fusszellen* with a number of spermatoblasts; and 4. The conversion of the spermatoblasts, which have united with the supporting cell, into spermatozoa.

3. These four processes take place successively and continuously (*schübweise*).

4. The multiplication of the spermospores is effected by indirect cell-division in the outer cell-layer of the seminal tubule.

5. The production of a crop of spermatoblasts follows preparatory changes of place of the spermospores and their conversion into substitutional mother-cells (*Ersatzmutterzellen*) and mother-cells through indirect cell-division in the inner cell-layers of the seminal tubuli.

6. After the formation of a generation of spermatoblasts, each of the functional "supporting cells," which lie next the outermost wall of the tubuli, conjugate with or become joined to a number of spermatoblasts.

7. Simultaneously or immediately after this conjugation has been established, the spermatoblasts are converted into spermatozoa.

8. This metamorphosis of the spermatoblasts consists in the conversion of their nuclei into the various organs of the spermatozoa, and the solution of the cell-body or their investment.

9. The rudiments of the organs of the spermatozoon arrange themselves with reference to the point of conjugation, in that the nearest part of the nucleus will become the head and the remotest the tail.

10. The spermatoblasts, during the entire metamorphosis, remain in organic union with the supporting cell, and, through active and passive changes in the latter, are formed into a bundle of spermatozoa.

11. The extrusion of the spermatozoa from the wall of the tubule follows spontaneous or active severing of their connection with the supporting cell, and by lateral pressure from the growing adjacent elements.

12. The various acts of secretion, in every portion of the tubuli, overlap in an orderly manner, and in such wise that at definite points the successive phenomena coincide in time.

If we assume the period of metamorphosis of a spermatoblast as a measure of time, we have

a. The close of each period of metamorphosis of the spermatoblasts marks the beginning of the multiplication of the spermospores.

b. The beginning of the period of metamorphosis coincides with the preparatory changes in the spermospores for the production of spermatoblasts.

c. The preparation for the production of spermatoblasts always corresponds to two periods of metamorphosis; and there are also always two crops in process of formation.

d. With the close of each period of metamorphosis there corresponds a generation of spermatoblasts, so that at the close of the metamorphosis, in the same tubule, the material for the next period lies in readiness.

13. In every portion of a testicular tubule a periodic secretion of spermatozoa and an uninterrupted succession of periods of secretion is possible.

14. The periods of secretion in different tubules do not coincide.

15. By means of a uniform alternation of the periods of secretion in the different portions of the tubuli, the conditions are supplied for a continual secretion of semen by the whole testis of a mammal.

PSYCHOLOGY.

Scientific Theism.[1]—In this book by Dr. Abbot we have an attempted reconciliation between Science, Philosophy, and Religion, in accordance with the scientific doctrine of evolution. As one of the first, if not the first, rational endeavor in this direction, from the stand-point of Philosophy, the book is a noteworthy one. The subject is treated of under three divisions, —viz., a long historical introduction; a part I., on the "Philosophy of Science;" and a part II., on the "Religion of Science." The position of the author is that of Scientific Realism, or Relationalism, as he terms it, as opposed to Idealism or Phenom-

[1] "Scientific Theism;" by Francis Ellingwood Abbot, Ph.D. Boston: Little, Brown & Co. 2d edition; 8vo.